beginning in the Pacific Ocean southeast of Japan, where the drift turns from a westerly to a northerly course, and flows to the north and then to the northeast to the Gulf of Alaska, where it divides into two branches, one continuing as a warm current through the Aleutian Islands and the other turning to the south to become the somewhat indefinite California Current. The California Current flows southward at some little distance from the western coast of the United States, and the water which has left the Tropics as the Japan Current is replaced by the California Current, so that the tropical ocean may not be losing water continually to the Alaskan region without adequate return to keep the amount of water in each place constant.

Near the coast of California the water is decidedly colder than it is in the open ocean, but as this coast strip has a lower temperature in the vicinity of Cape Mendocino than it has either north or south of this point, the cold strip must be the result of an upwelling of cold water from the depths of the ocean and not the result of an ocean current. The reports of vessels show that the movement of the surface of the ocean near the shore is irregular, but that farther out there is a general movement toward the Equator.

The facts of observation show that the Japan Current does not come within 900 miles of any part of California, and consequently can have little influence upon the climate of the State. But it is a fact that the climate of California is much milder than that of the greater part of the United States. The explanation is to be found in the great ocean which lies to the west and in the fact that the winds prevailingly blow from this ocean to the land. The temperature of the ocean water varies little from 55° during the year; in some places it is more and in some places less, but it is everywhere relatively constant through the year. The air lying over this great body of water has nearly the same temperature as the water, but were it not for the westerly winds, the climate of California would be little influenced by the ocean.

Compared with the land areas in the same latitudes the oceans have very mild climates. Everywhere the oceans are warm in winter and cool in summer because water is, of all the substances we know, among the most difficult to heat and to cool. The result is that the temperatures of the ocean and the air over the ocean remain nearly constant. But land is about twice as easy to heat and twice as easy to cool as is water, so that the land and the air over it have warm summers and cold winters, warm days and cool nights.

The fact that the winds blow from the ocean to the land is of the greatest importance to California. It is these winds which bring the mild ocean air over the land and give to this State a climate cooler in summer and warmer in winter than that of other parts of the country. The Pacific Ocean and the westerly winds from the ocean can and do produce all the beneficial results that have been claimed for the Japan Current, and it is to these two features of nature that we owe our mild climate. Whatever effect the Japan Current may have upon the Gulf of Alaska and upon the climate of the Territory of Alaska, and there is no doubt that this effect is very important, the State of California owes nothing to this warm current. The cool summers in the coast region of the State and the fogs which occur during that season are, in part, due to the presence of the cold water off the coast, and that part of the North Pacific drift known as the California Current may be one of the reasons for the existence of this cold water, although a far more important reason seems to be the upwelling of the cold water from the ocean depths. It is the Pacific Ocean and the westerly winds to which we must look for the chief reasons why the climate of the Golden State is favored above that of other lands.

MILD WINTER OF 1913-14.

AN UNUSUAL PHENOMENON.

Dr. Louis Bell writes from Boston, U. S. A., to describe an unusual meteorological phenomenon observed there last month. On January 13, which was the coldest day known in Boston for many years, the thermometer not ranging above 0° F. for a period of 30 hours extending through the entire day, Dr. Bell, upon entering a large train shed some 75 feet high and of a very extensive area, found that snow was steadily falling, produced by the congelation of the steam from the numerous locomotives. The interesting point was that the snow had aggregated into flakes of fair size, not distinctly crystalline, but still flakes, in spite of the short distance of the possible fall. The thermometer was then about 5° F. below zero, and in the evening at a similar temperature the whole interior of the train shed was still white with this deposit of snow. The general phenomenon, of course, has been many times recorded, but is very rarely seen, particularly on so large a scale and for so long a time.

WINTER OF 1913–14.

The exceptionally mild character of the present winter is being maintained until its close, and for a persistent continuance of warm days in January and February it surpasses all previous records. At Greenwich the thermometer in the screen was above 50° for 18 consecutive days from January 20 to February 15. Previous records since 1841 have no longer period than 11 days, in the months of January and February combined, with the thermometer continuously above 50°, and there are only four such periods—1846, January 21–31; 1849, January 16–26; 1856, February 6–16; and 1873, January 4–14. Besides these there are only three years, 1850, 1869, and 1877, with a consecutive period of 10 days in January and February with the temperature above 50°. The persistent continuance of the absence of frost is also very nearly a record. To February 24 there have been 30 consecutive days at Greenwich without frost in the screen, and the only years with a longer continuous period in January and February are 1867, with 37 days; 1872, with 43 days; and 1884, with 32 days. The maximum temperatures in the two months have seldom been surpassed. In many respects there is a resemblance between the weather this winter and that in 1899, when in February blizzards and snowstorms were severe on the other [American] side of the Atlantic, with tremendous windstorms in the open ocean, whilst on this side of the Atlantic the weather was exceptionally mild. It is to be hoped that this year we shall be spared the somewhat sharp frosts experienced in the spring of 1899. (Nature, London, Feb. 26, 1914, v. 92, p. 720–721.)

ON THE AMOUNT OF EVAPORATION.[1]

By Y. HORIGUTI.

[Dated Kobe Meteorological Observatory, January, 1913.]

(1) In the present note I intend to give some results of my investigation of the evaporation of water in an atmometer that is freely exposed to wind and sunshine.

This apparatus is a cylindrical copper vessel 20 centimeters in diameter and 10 centimeters deep. It is placed on the surface of ground that is covered with sod. Fresh water is poured in it to the depth of 2 centimeters and is freely exposed to sunshine and wind.

Every morning at 10 o'clock the amount of evaporation is determined by measuring the loss of water during the exposure. When rain or snow has fallen during the exposure the measured evaporation is corrected for the amount of precipitation shown by the rain gage placed near and at the same height with the atmometer.

First let us investigate theoretically the relation of evaporation and other meteorological elements.

(2) Suppose the case when the vaporizing water is not exposed to wind and direct sunshine, and is unhindered. Moreover, let us assume that the cylindrical vessel is so large that the effect of the surface tension at its periphery may be neglected.

Let the z-axis be vertical. Let p be the partial vapor pressure, then the upward force is $\frac{\partial p}{\partial z}$. The gravity and the resistance of air act downward.

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[1] Revised reprint from Journal of the Met. Soc. of Japan, May, 1913, 32d year, No. 5, pp. 14–26.